

National Institute  
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National Voluntary  
Laboratory Accreditation Program

ISO/IEC 17025:1999  
ISO 9002:1994

## Scope of Accreditation



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### CALIBRATION LABORATORIES

NVLAP LAB CODE 200403-0

#### SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

P.O. Box 47299  
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NVLAP Code: 20/A01

ANSI/NCSL Z540-1-1994; Part 1

Compliant

### DIMENSIONAL

NVLAP Code: 20/D03

Gage Blocks - Steel and Chrome Carbide

Range in inches	Best Uncertainty ( $\pm$ ) in $\mu$ inches <sup>note 1,2</sup>	Remarks
0.05	2.6	Mechanical Comparison
0.1	2.5	Mechanical Comparison
0.125	2.7	Mechanical Comparison
0.14	2.4	Mechanical Comparison
0.25	2.5	Mechanical Comparison
0.5	2.8	Mechanical Comparison
0.75	2.8	Mechanical Comparison
1.0	3.2	Mechanical Comparison
2.0	3.9	Mechanical Comparison

March 31, 2004

Effective through

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4.0	6.6	Mechanical Comparison
5.0	6.8	Mechanical Comparison
12.0	12.0	Mechanical Comparison
20.0	21.4	Mechanical Comparison

**NVLAP Code:** 20/D03

Gage Blocks - Ceramic and Tungsten Carbide

<i>Range in inches</i>	<i>Best Uncertainty (<math>\pm</math>) in <math>\mu</math> inches<sup>note 1,2</sup></i>	<i>Remarks</i>
0.05	3.6	Mechanical Comparison and probe penetration correction
0.1	3.5	Mechanical Comparison and probe penetration correction
0.125	3.7	Mechanical Comparison and probe penetration correction
0.14	3.4	Mechanical Comparison and probe penetration correction
0.25	3.5	Mechanical Comparison and probe penetration correction
0.5	3.8	Mechanical Comparison and probe penetration correction

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0.75	3.8	Mechanical Comparison and probe penetration correction
1.0	4.2	Mechanical Comparison and probe penetration correction
2.0	4.9	Mechanical Comparison and probe penetration correction
4.0	7.6	Mechanical Comparison and probe penetration correction
5.0	7.8	Mechanical Comparison and probe penetration correction
12.0	13.0	Mechanical Comparison and probe penetration correction
20.0	22.4	Mechanical Comparison and probe penetration correction

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SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

**NVLAP Labcode:** 20/D07

Measuring Wires

<i>Range in Inches</i>	<i>Best Uncertainty (<math>\pm</math>) <math>\mu</math>inches<sup>note 1</sup></i>	<i>Remarks</i>
0.007227 (80 TPI) to 0.14434 (4 TPI)	10.8	Universal Measuring Machine with Master Set Calibration

**NVLAP Code:** 20/D11

Spherical Diameter, Plug/Ring Gages

<i>Range in inches</i>	<i>Best Uncertainty (<math>\pm</math>) in <math>\mu</math> inches<sup>note 1,2</sup></i>	<i>Remarks</i>
Ring Gages		
0.25 to 1.00	8.0	Comparison to Gage Blocks
> 1.0 to 6.0	13.7	Comparison to Gage Blocks
Plug Gages		
> 0 to 0.5	4.5	Comparison to Gage Blocks
> 0.5 to 3.0	8.0	Comparison to Gage Blocks
> 3.0 to 6.0	15.1	Comparison to Gage Blocks

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### SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

**NVLAP Code:** 20/D14

Threaded Plug and Ring Gages

Threaded Plug Gages, 60° Unified

	<i>Range</i>	<i>Best Uncertainty (<math>\pm</math>)<sup>note 1,2</sup></i>	<i>Remarks</i>
Pitch Diameter	>0 to 0.375 in	25.3 $\mu$ in	Three Wire Method
	>0.375 to 6.0 in	26.2 $\mu$ in	Three Wire Method
Major Diameter	1.0 to 6.0 in	(35 + 1.1 x 10 <sup>-6</sup> L) $\mu$ in	Universal Measuring Machine
Half Angle	60°	3 arc minutes	Optical Comparator Inspection
Pitch	4 to 80 TPI	28 $\mu$ in	Universal Measuring Machine

Threaded Ring Gages, Solid, 60° Unified

	<i>Range</i>	<i>Best Uncertainty (<math>\pm</math>)<sup>note 1</sup></i>	<i>Remarks</i>
Pitch Diameter	>0 to 0.750 in	48.4 $\mu$ in	Universal Measuring Machine
Minor Diameter	>0 to 0.750 in	158.4 $\mu$ in	Measured with Bore Micrometer
Minor Diameter	>0.750 to 1.75 in	94.9 $\mu$ in	Measured with Bore Micrometers

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Minor Diameter	1.75 to 3.999 in	250 $\mu$ in	Measure with Bore Micrometers
Minor Diameter	4.0 to 8.0 in	600 $\mu$ in	Measured with Bore Micrometers
Half Angle	60°	4 arc minutes	Optical Inspection of Thread Casting

### Threaded Ring Gates, Split, 60° Unified

	Range	Best Uncertainty ( $\pm$ ) <sup>note 1</sup>	Remarks
Functional Diameter	>0 to 6 in, 4 to 80 TPI	83 $\mu$ in	Fit Test with Class W Thread Plug
Minor Diameter	>0 to 0.272 in	55 $\mu$ in	Compared to Go/NoGo Plugs
Minor Diameter	0.273 to 0.499 in	150 $\mu$ in	Measured with Bore Micrometers
Minor Diameter	0.5 to 3.999 in	250 $\mu$ in	Measured with Bore Micrometers
Minor Diameter	4.0 to 8.0 in	600 $\mu$ in	Measured with Bore Micrometers

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SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

### ELECTROMAGNETICS - DC/LOW FREQUENCY

NVLAP Code: 20/E02

AC Current

*Best Uncertainty ( $\pm$ ) in ppm<sup>note 1</sup>  
Frequency in Hertz*

<i>Current</i>	<i>10</i>	<i>20</i>	<i>40</i>	<i>1 k</i>	<i>5 k</i>	<i>10 k</i>
20 mA	120	120	110	110	110	110
200 mA	120	120	110	110	110	110
2 A			120	120	120	120
10 A			180	180	200	200

NVLAP Code: 20/E05

DC Current

<i>Range (<math>\pm</math>)</i>	<i>Best Uncertainty (<math>\pm</math>) in ppm<sup>note 1</sup></i>	<i>Remarks</i>
200 $\mu$ A	22	
2.0 mA	22	
20 mA	22	
200 mA	22	
2.0 A	40	

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### SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

3.0 A	120
5.0 A	120
10.0 A	120

*NVLAP Code:* 20/E05  
DC Resistance

<i>Range in ohms</i>	<i>Best Uncertainty (<math>\pm</math>) in ppm<sup>note 1</sup></i>	<i>Remarks</i>
1.0	2	Using Guildline Bridge
10.0	2	Using Guildline Bridge
100.0	2	Using Guildline Bridge
1000.0	2	Using Guildline Bridge
10000.0	2	Using Guildline Bridge
100000.0	2	Using Guildline Bridge
0.01	0.234 (in %)	Using 242D System
0.1	234.0	Using 242D System
1.0	25.0	Using 242D System
10.0	13.0	Using 242D System

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100.0	12.5	Using 242D System
1000.0	12.5	Using 242D System
10000.0	12.5	Using 242D System
100000.0	12.0	Using 242D System
1.0 M	12.0	Using 242D System
10.0 M	12.0	Using 242D System
100.0 M	17.5	Using 242D System

**NVLAP Code:** 20/E06  
DC Voltage - Generation

<b>Range (<math>\pm</math>)</b>	<b>Best Uncertainty (<math>\pm</math>) in ppm <sup>note 1</sup></b>	<b>Remarks</b>
0.1 V	3.0	
0.2 V	2.1	
1.0 V	1.8	
2.0 V	1.8	
10.0 V	1.8	
20.0 V	1.8	
100.0 V	1.8	

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#### SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

200.0 V	2.0
1000.0 V	2.0
DC Voltage - Measurement	
0.1 V	8.0
0.2 V	8.0
1.0 V	4.0
2.0 V	4.0
10.0 V	3.5
20.0 V	3.5
100.0 V	5.0
200.0 V	5.0
1000.0 V	5.0

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NVLAP Code: 20/E09

LF AC Voltage

*Best Uncertainty ( $\pm$ ) in ppm<sup>note 1</sup>  
Frequency in Hertz*

Range	10	20	40	50	300	1 k	20 k	50 k	100 k	300 k	500 k	1 M
20 mV	110	100	100			100	100	200	310	410	580	580
200 mV	50	50	30			30	30	50	90	150	150	240
2 V	100	40	30			20	20	40	50	120	120	120
20 V	40	40	30			20	20	40	50	120	130	130
200 V	40	45	25			25	25	50	60			
300 V							40					
600 V								60	80			
1000 V			35	35	30	30	40	40				

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### SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

#### TIME AND FREQUENCY

**NVLAP Code:** 20/F01

Frequency Dissemination

**Range**

1 MHz, 5 MHz, 10 MHz

**Best Uncertainty ( $\pm$ )<sup>note 1</sup>**

$5.0 \times 10^{-12}$

**Remarks**

Comparison using FMS

**NVLAP Code:** 20/F02

Time Dissemination

**Range**

n/a

**Best Uncertainty ( $\pm$ )<sup>note 1</sup>**

1  $\mu$  second

**Remarks**

UTC(USNO) Transfer

#### MECHANICAL

**NVLAP Code:** 20/M06

Force

**Nominal Force in lbf**

50 to 500

500 to 2000

2000 to 5000

5000 to 10000

**Best Uncertainty ( $\pm$ )<sup>note 1</sup>**

0.071%

0.085%

0.075%

0.075%

**Remarks**

Proving Rings

Proving Rings

Proving Rings

Proving Rings

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10000 to 25000	0.072 %	Proving Rings
25000 to 100000	0.090 %	Proving Rings

**NVLAP Code:** 20/M06  
Force - Torque

Calibration of strain gage torque standards, increasing torque, non-adjustable, defined scale instruments.

<i>Range in lb-ft</i>	<i>Best Uncertainty (<math>\pm</math>)<sup>note 1</sup></i>	<i>Remarks</i>
10 to 100	0.045 % of Full Scale	Comparison to moment arm and dead weights
> 100 to 6500	0.025 % of Full Scale	Comparison to moment arm and dead weights

**NVLAP Code:** 20/M08  
Mass

<i>Range</i>	<i>Best Uncertainty (<math>\pm</math>) in mg<sup>note 1</sup></i>	<i>Remarks</i>
20 kg	63	Double Substitution
10 kg	32	Double Substitution
5 kg	17	Double Substitution
2 kg	9	Double Substitution
1 kg	5	Double Substitution

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500 g	3	Double Substitution
200 g	1	Double Substitution
100 g	0.4	Double Substitution
50 g	0.3	Double Substitution
20 g	0.1	Double Substitution
10 g	0.1	Double Substitution
5 g	0.1	Double Substitution
2 g	0.05	Double Substitution
1 g	0.03	Double Substitution

### THERMODYNAMICS

NVLAP Code: 20/T03  
Laboratory Thermometers

<i>Nominal Temperature in °F</i>	<i>Best Uncertainty <math>\pm</math> °F<sup>note 1</sup></i>	<i>Remarks</i>
-40.0 to 300	0.38	Liquid in Glass
-40.0 to 300	0.52	Bi-metallic

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**NVLAP Code:** 20/T05

Pressure Gage

**Nominal Pressure in psi**

**Best Uncertainty ( $\pm$ )<sup>note 1</sup>**

**Remarks**

5 to 70	495.9 ppm	Ruska 2565-751
80 to 100	175.3 ppm	Ruska 2565-751
100 to 2000	94.6 ppm	Ruska 2481-700
2000 to 10000	149.8 ppm	Ruska 2481-700

Pressure Absolute

**Nominal Pressure in inches  
of Hg**

**Best Uncertainty ( $\pm$ ) inches of Hg<sup>note 1</sup>**

**Remarks**

0.510232	0.000282	Ruska 2565-751
1.602940	0.000234	Ruska 2565-751
3.203770	0.000105	Ruska 2565-751
6.405820	0.000188	Ruska 2565-751
9.607630	0.000279	Ruska 2565-751
12.809400	0.000371	Ruska 2565-751
16.011200	0.000463	Ruska 2565-751
19.213100	0.000556	Ruska 2565-751

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22.415200	0.000648	Ruska 2565-751
25.617000	0.000740	Ruska 2565-751
28.819000	0.000832	Ruska 2565-751
31.995700	0.000924	Ruska 2565-751

#### Pressure Gage

<i>Nominal Pressure in psi</i>	<i>Best Uncertainty (<math>\pm</math>)<sup>note 1</sup></i>	<i>Remarks</i>
0 to 4	0.001 psi	King Nutronics 3689A
4 to 10000	0.025% Indicated Value	King Nutronics 3689A

#### Pressure - Absolute

<i>Nominal Pressure in inches of Hg</i>	<i>Best Uncertainty (<math>\pm</math>)<sup>note 1</sup></i>	<i>Remarks</i>
0.5 to 35	0.002 inches of Hg	King Nutronics 3689A

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SWFLANT METROLOGY LABORATORY OPERATED BY LOCKHEED MARTIN

*NVLAP Code:* 20/T07

Resistance Thermometers

<i>Temperature Range in °C</i>	<i>Best Uncertainty (±) °C</i>	<i>Remarks</i>
37.8	0.069	PRT reference in Precision Bath
65.56	0.075	PRT reference in Precision Bath
107.22	0.069	PRT reference in Precision Bath
148.8	0.071	PRT reference in Precision Bath
-40.0	0.039	PRT reference in Hart Bath
37.8	0.018	PRT reference in Hart Bath
0.0	0.013	Ice Point

1. Represents an expanded uncertainty using a coverage factor,  $k=2$ .
2. L is length or diameter in inches.

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